UNITED STATES PATENT AND TRADEMARK OFFICE

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10/560,185	12/09/2005	Vladimir Pekar	PHDE030206US	1460

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EXAMINER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>03</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>09 December 2005</u>.
2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-16</u> is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) <u>1-16</u> is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on <u>09 December 2005</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All   b)☐ Some * c)☐ None of:
      1.☐ Certified copies of the priority documents have been received.
      2.☐ Certified copies of the priority documents have been received in Application No. _____.
      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date <u>12/09/2005</u>.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 101

1.   35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

> Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs, which impart functionality when employed as a computer component. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.

When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare In re Lowry, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (Claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and Warmerdam, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with Warmerdam, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).

In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between

the computer program and the rest of the computer which permit the computer

program's functionality to be realized, and is thus statutory. See Lowry, 32 F.3d at 1583-

84, 32 USPQ2d at 1035.

2.   **Claim 13 is** rejected under 35 U.S.C. 101 because the claimed invention is

directed to non-statutory subject matter as follows.

3.   **Claim 13 recites** "a computer program for an image processing unit for

segmenting……. " embodying functional descriptive material However, the claim does

not define a computer-readable medium or memory and is thus non-statutory for that

reason (i.e., "When functional descriptive material is recorded on some computer-

readable medium it becomes structurally and functionally interrelated to the medium

and will be statutory in most cases since use of technology permits the function of the

descriptive material to be realized" – Guidelines Annex IV). That is, the scope of the

presently claimed "a computer program" (line 1 of claim 13) can range from paper on

which the program is written, to a program simply contemplated and memorized by a

person. The Examiner suggests amending the claim such as **"A computer-readable**

medium embodied with a computer program for an image processing unit for

segmenting……..." or equivalent in order to make the claim statutory. Any amendment

to the claim should be commensurate with its corresponding disclosure.

Claim Rejections - 35 USC § 103

4.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5.   Claims 1, 2, 5-8 and 11-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chalana et al (U. S. 7,158,692 B2) in view of Paragios et al (U. S. 7,079,674 B2).

Regarding claim 1, Chalana discloses method of segmenting a three-dimensional structure of interest which is contained in an object from a plurality of two-dimensional images, wherein each of the plurality of images represents a slice of the object, the method comprising the steps of:

determining images of the plurality of two-dimensional images with insufficient feature information for the structure of interest (please note, to column 12, lines 64-67 and column 15, lines 5-10);

segmenting the structure of interest in the plurality of images by using the attractors (please note, to column 6, lines 31-45 and column 17, lines 45-52). However, Chalana is silent about the specific details regarding the step of:

manually drawing attractors in the form at least a partial contour of the structure of interest in the images of the plurality of two-dimensional images.

In the same field of endeavor however, Paragios discloses variational approach the segmentation of the left ventricle in MR cardiac images comprising the step of:

manually drawing attractors in the form at least a partial contour of the structure of interest in the images of the plurality of two-dimensional images (please note, to column 1, lines 56-62 and column 14, lines 53-56).

It would have been obvious to a person of ordinary skill in the art at the time the

invention was made to use manually drawing attractors in the form at least a partial

contour of the structure of interest in the images of the plurality of two-dimensional

images as taught by Paragios in the system of Chalana because Paragios provides

Chalana a method which improve the segmentation performance under the condition

that the general model can describe a fairly large portion of the eligible segmentation

solutions.

Regarding claim 2, Chalana discloses method according to claim 1, wherein the

determination of images of the plurality of two-dimensional images with insufficient

feature information for the structure of interest comprises the steps of:

segmenting the structure of interest in the plurality of images (please note, to

column 17, lines 45-52); identifying the images of the plurality of two-dimensional

images with insufficient feature information for the structure of interest on the basis of at

least one decision criterion 9please note, to column 3, lines 21-26).

Regarding claim 5, Chalana discloses method according to claim 1, wherein the

manual drawing of attractors in the form of at least a partial contour of the structure of

interest in the images of the plurality of two-dimensional images includes an assignment

of labels to voxels corresponding to the at least partial contour such that the attractors

are considered as strong edges of the structure of interest during segmentation (please

note, to column 16, lines 50-67).

Regarding claim 6, Chalana discloses method according to claim 1, wherein the

method is for radiotherapy planning on the basis of CT images (please note, to column

6, liners 25-31).

Regarding claim 7, Chalana discloses image processing device, comprising:

a memory (please note, to column 5, lines 13-16) for storing a plurality of two-dimensional images wherein each of the plurality of images represents a slice of an object (please note, to column 12, lines 64-67 and column 15, lines 5-10);

an image processor (please note, to fig. 2, element 180 and column 7, lines 58-63) for segmenting a three-dimensional structure of interest which is contained in the object from the plurality of two-dimensional images, which image processor is adapted to perform the following operation (please note, to column 9, lines 64-67 and column 15, lines 5-10);

determining images of the plurality of two-dimensional images with insufficient feature information for the structure of interest (please note, to column 12, lines 64-67 and column 15, lines 5-10);

segmenting the structure of interest in the plurality of images by using the attractors (please note, to column 6, lines 31-45 and column 17, lines 45-52). However, Chalana is silent about the specific details regarding the steps of:

a pointer for drawing attractors in the plurality of two-dimensional images;

acquiring attractors manually indicated by a user, wherein the attractors have the form of at least a partial contour of the structure of interest in the images of the plurality of two-dimensional images.

In the same field of endeavor however, Paragios discloses variational approach the segmentation of the left ventricle in MR cardiac images comprising the steps of:

a pointer for drawing attractors in the plurality of two-dimensional images (please

note, to column 1, lines 56-62);

acquiring attractors manually indicated by a user, wherein the attractors have the

form of at least a partial contour of the structure of interest in the images of the plurality

of two-dimensional images (please note, to column 1, lines 56-62 and column 14, lines

53-56).

It would have been obvious to a person of ordinary skill in the art at the time the

invention was made to use manually drawing attractors in the form at least a partial

contour of the structure of interest in the images of the plurality of two-dimensional

images as taught by Paragios in the system of Chalana because Paragios provides

Chalana a useful method which improve the segmentation performance under the

condition that the general model can describe a fairly large portion of the eligible

segmentation solutions.

Claim 8 is similarly analyzed as claim 2 above.

Claim 11 is similarly analyzed as claim 5 above.

Regarding claim 12, Chalana discloses image processing device according to

claim 7, wherein the image procession device is one of a radiotherapy planning device,

a radiotherapy device, a workstation, a computer and a personal computer (please note,

to fig. 1, element 110).

Claim 13 is similarly analyzed as claim 1 above.

Claim 14 is similarly analyzed as claim 7 above.

Regarding claim 15, Chalana discloses the imaging processor of claim 14,

wherein the second set of two-dimensional images is formed by those images where automatic segmentation failed (please note, to column 6, lines 40-45).

Regarding claim 16, Chalana discloses the imaging processor of claim 14, wherein the segmented image is used to provide a radiation therapy plan (please note, to column 6, liners 25-31).

6.   Claims 3, 4, 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chalana et al (U. S. 7,158,692 B2) and Paragios et al (U. S. 7,079,674 B2) as applied to claims 1 and 7 above and further in view of Zahalka et al (U. S 6, 385, 332 B1).

Regarding claim 3, Chalana and Paragios are silent about the specific details regarding method according to claim 2, wherein the segmentation of the structure of interest in the plurality of images is based on an adaptation of a deformable model whose surface is formed by a network of meshes which interconnect network points on the surface of the deformable model to the structure of interest; and wherein the adaptation of the deformable model is based on an iterative optimization of an internal energy based on a distance between the deformable model after adaptation and the deformable model and an external energy based on a distance between the deformable model after adaptation and feature points on the structure of interest.
In the same field of endeavor however, Paragios discloses automated segmentation method for 3-dimensional ultrasound comprises the segmentation of the structure of interest in the plurality of images is based on an adaptation of a deformable model whose surface is formed by a network of meshes which interconnect network points on

the surface of the deformable model to the structure of interest (please note, to column

4, lines 65-67 and column 5, lines 1-12); and wherein the adaptation of the deformable

model is based on an iterative optimization of an internal energy based on a distance

between the deformable model after adaptation and the deformable model and an

external energy based on a distance between the deformable model after adaptation

and feature points on the structure of interest (please note, to fig. 7 and column 11, lines

39-46).

It would have been obvious to a person of ordinary skill in the art at the time the

invention was made to use an adaptation of a deformable model whose surface is

formed by a network of meshes and an external energy based on a distance between

the deformable model after adaptation and feature points on the structure of interest as

taught by Zahalka in the system of Chalana because Zahalka provides Chalana an

improved segmentation method for three dimensional ultrasound. The method is fast

and involves minimal user interaction and minimal processing.

    Claim 4 is similarly analyzed as claim 3 above.

    Claim 9 is similarly analyzed as claim 3 above.

    Claim 10 is similarly analyzed as claim 4 above.

Contact Information

7.   Any inquiry concerning this communication or earlier communications from the

Examiner should be directed to ABOLFAZL TABATABAI whose telephone number is

(571) 272-7458.

The Examiner can normally be reached on Monday through Friday from 9:30 a.m. to 7:30 p.m. If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Brian Werner, can be reached at (571) 272-7401. The fax phone number for organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Abolfazl Tabatabai/

Primary Examiner, Art Unit 2624

August 26, 2008